

REMARKS

This Amendment is in response to the Decision of the Board of Patent Appeals and Interferences (hereinafter "the Board") dated April 21, 2003.

Claims 1-38 were previously pending in the above-referenced application. The Examiner's rejections of these claims was affirmed in the Board's Decision.

Claims 3 and 6 have been canceled without prejudice or disclaimer.

New claims 39-46 have been added.

Reconsideration of the above-referenced application is respectfully requested.

Rejection Under 35 U.S.C. § 103(a)

Claims 1-38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of teachings from U.S. Patent 5,814,563 to Ding et al. (hereinafter "Ding") and U.S. Patent 5,626,716 to Bosch et al. (hereinafter "Bosch").

M.P.E.P. § 706.02(j) sets forth the standard for a rejection under 35 U.S.C. § 103(a):

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Ding teaches, among other things, a dry etch process in which a chemical combination that includes a fluorocarbon gas, an ammonia-generating (NH₃-generating) gas, and a carbon-oxygen gas is used to dry etch dielectric materials such as doped and undoped silicon dioxide. *See, e.g.*, col. 2, lines 32-43. Ding also teaches that, by use of the chemical combination disclosed therein, dielectric materials, such as doped and undoped silicon oxides, may be removed with selectivity over underlying substrate materials, such as silicon or gallium arsenide. *See, e.g.*, col. 3, lines 49-54. Ding further provides that the dry etchant chemical combination

etches dielectric materials with selectivity over both photoresist materials and polysilicon.

Col. 7, lines 44-49. Among the various fluorocarbons that are specifically disclosed in Ding as being useful in the chemical combination are CHF_3 and $\text{C}_2\text{H}_4\text{F}_2$. See, e.g., col. 2, line 62, to col. 3, line 2.

Bosch teaches a dry etch process in which a chemical combination that includes CHF_3 (Freon-23) and neon (Ne) is used to remove doped silicon oxide with selectivity over undoped silicon oxide, silicon nitride, silicide, and silicon. See, e.g., col. 2, lines 34-44. Any of these materials may, therefore, be used as an etch stop when a doped silicon oxide is being dry etched with the disclosed combination of CHF_3 and Ne. See, e.g., col. 4, lines 43-48. Bosch does not disclose, teach, or suggest any dry etchant chemical combination that includes $\text{C}_2\text{H}_x\text{F}_y$, where x is an integer from three to five, inclusive, y is an integer from one to three, inclusive, and $x + y = 6$. Nor does Bosch disclose, teach, or suggest that any such dry etchant chemical combination may be used to dry etch doped silicon oxide with selectivity over undoped silicon oxide or even that doped silicon oxide may be dry etched with such a chemical combination.

Independent claim 1, as amended and presented herein, recites a dry etchant which *consists essentially of* a first component and a second component. The first component of the dry etchant recited in amended independent claim 1 has the general formula $\text{C}_2\text{H}_x\text{F}_y$, where x is an integer from three to five, inclusive, y is an integer from one to three, inclusive, and $x + y = 6$. The second component of the dry etchant of amended independent claim 1 consists of at least one fluorocarbon. The dry etchant is formulated to etch doped silicon dioxide with selectivity over at least undoped silicon dioxide.

Independent claim 20, as amended and presented herein, recites a dry etchant which consists essentially of at least one fluorocarbon. The at least one fluorocarbon of amended independent claim 20 includes a component which comprises $\text{C}_2\text{H}_x\text{F}_y$, where x is an integer from three to five, inclusive, y is an integer from one to three, inclusive, and $x + y = 6$. In addition, amended independent claim 20 recites that the dry etchant thereof is formulated to etch doped silicon dioxide at a faster rate than at least undoped silicon dioxide.

Support for these amendments is found, for example, at page 10, lines 1-6 of the specification of the above-referenced application, which only provides relative flow rates for $C_2H_xF_y$, where x is an integer from three to five, inclusive, y is an integer from one to three, inclusive, and $x + y = 6$, and other fluorocarbons.

It is respectfully submitted that Ding and Bosch do not support a *prima facie* case of obviousness against any of claims 1-38 since Ding teaches away from the subject matter recited in claims 1-38.

In particular, Ding teaches a dry etchant combination which requires one or more fluorohydrocarbon gases, one or more NH_3 -generating gases, and a carbon-oxygen gas. Col. 2, lines 37-43; col. 2, lines 52-61.

In contrast, amended independent claim 1 recites a dry etchant which *consists essentially* of a first component comprising $C_2H_xF_y$, where x is an integer from three to five, inclusive, y is an integer from one to three, inclusive, and $x + y = 6$, and a second component consisting of at least one fluorocarbon. While this language does not exclude the presence of components, such as a carrier gas, which are not essential to the characteristics of the recited dry etchant, it does exclude other components, such as an NH_3 -generating gas or a carbon-oxygen gas, that would materially alter the characteristics of the recited dry etchant. *See* M.P.E.P. § 2111.03. In fact, Ding, at col. 2, lines 46-51, notes that the NH_3 -generating gas is at least partially responsible for accelerated dielectric etch rates when a photoresist is also present.

Likewise, amended independent claim 20 is drawn to a dry etchant which *consists essentially of* at least one fluorocarbon.

As Ding teaches away from the subject matter recited in amended independent claims 1 and 20, it is respectfully submitted that the subject matter recited in these claims, as well as that recited in claims 2, 4, 5, and 7-19, which depend from claim 1, and claims 21-38, is allowable over the combination of Ding and Bosch.

Therefore, one of ordinary skill in the art could not reasonably expect the asserted combination of teachings from Bosch and Ding to successfully result in the claimed subject

matter. Thus, a *prima facie* case of obviousness has not been established against any of claims 1, 2, 4, 5, or 7-38.

As claims 3 and 6 have been canceled without prejudice or disclaimer, the rejections of these claims are moot.

For these reasons, withdrawal of the 35 U.S.C. § 103(a) rejections of claims 1, 2, 4, 5, and 7-38 is respectfully requested.

New Claims

New claims 39-46 have been added. New claims 39-42 depend either directly or indirectly from claim 1, while new claims 43-46 depend either directly or indirectly from claim 20.

New claims 39-41 and 43-45 recite relative amounts of components of the dry etchant in a total gas flow thereof. Support for the subject matter recited in these claims is located in the specification of the above-referenced application, for example, at page 10, lines 1-6.

New claims 42 and 46 recite that the dry etchants of claims 1 and 20, respectively, may further include at least one carrier gas, the use of which is well-known in dry etchant systems.

Entry and allowance of new claims 39-46 are respectfully solicited.

CONCLUSION

It is respectfully submitted that each of claims 1, 2, 4, 5, and 7-46 is allowable. An early indication of the allowability of each of these claims and an indication that the above-referenced application has been passed for issuance are respectfully solicited. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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